SHORT COMMUNICATION

OCCURRENCE OF THE ASCIDIAN *Styela clava* HERDMAN IN HOBSONS BAY, VICTORIA: A NEW RECORD FOR THE SOUTHERN HEMISPHERE

Introduction

The pleurogonid aseidian *Styela clava* Herdman is indigenous to the north-western Paeific, i.e. Japanese waters, the Sea of Okhotsk and parts of the Korean and Siberian eoasts (Millar 1960). It was recorded as an immigrant to British waters by Carlisle (1954) who considered it to be a new speeies, *Styela mammiculata*. Millar (1960) showed that *S. mammiculata* Carlisle was in fact *Stycla clava*.

Sinee its detection in Plymouth, *Styela clava* has been recorded from other localities on the south coast of England (Holmes 1969; Houghton & Millar Millar 1960; Stubbings & Houghton 1964), from Milford Haven, Wales (Coughlan 1969), from Cork, Eire (Guiry & Guiry 1973), and from the French eoast of the English Channel (Monniot 1970). *Styela clava* in European waters thus appears to be spreading from the original point of introduetion.

Occurrence in Hobsons Bay, Victoria

During diving studies in Hobsons Bay (37° 51′ S, 144° 55′ E) in December 1972 and January 1973, the author diseovered *Styela clava* growing at depths of one metre or more below chart datum on the piles supporting two navigational beaeons at the mouth of the River Yarra. Subsequcnt surveys have shown the species to occur widely within Hobsons Bay. Its most southerly oeeurrenee to date has been at Point Ormond (144° 58′ E, 37° 53′ S) where a single specimen was taken from a sand/shell bottom at 3 m depth (Poore, personal communication). Preliminary surveys of the epibiota of artificial surfaees in other areas of Port Phillip Bay and in Western Port, the latest in January and February 1975 (Holmes, unpublished), have failed to detect the species outside Hobsons Bay.

Biology of *Styela clava*

Styela clava may attain a length of up to 160 mm (Holmes 1969); specimens of 145 mm length have been found in Hobsons Bay. Studies on the speeies in Southampton Water, U.K. (Holmes 1969) whcre water temperatures ranged between 2° and 23°C, showed that it bred throughout all but the coldest two or three months, with a marked peak of settlement in mid to late summer (late July to early September). Densities of up to 500 adults per m^2 were recorded from Southampton Water, where the speeies ranged up to mid-tide level in locations sheltered from the sun.

Stycla clava appears to be a secondary settler, in the sense that it colonizes only those surfaces bearing a well-developed epibiota. In Southampton Water it was restrieted to areas of low wave energy and almost maximum ramine salinity; Guiry and Guiry (1973) found a similar situation in Cork Harbour.

In Hobsons Bay, population densities of up to 600 adults per m^2 have been found on artificial test panels submerged in the upper sublittoral zone. No data are yet available on the timing of breeding in this area, where the annual temperature range is from about 10° to 23°C (Holmes, unpublished). A study of the annual gonadal eycle is currently in progress. As in Southampton Water, the species appears to be a secondary settler, appearing on test panels submerged for more than three months. Within Hobsons Bay the species is eonfined to relatively sheltered areas at depths below the halocline or in areas of high salinity and has not been reeorded from the littoral zone. The precise effeets of salinity fluctuations on the occurrence and survival of *Styela clava* remain to be investigated.

Method of Introduction and Further Spread

Several authors (e.g. Millar 1971) have suggested that the introduction of *Styela clava* to European waters was by accidental transport as fouling organisms on ships' hulls. Certainly, once established the species has spread around the coasts of the English Channel within twenty years. The precise route of introduction of *Styela clava* to Australian waters is problematic, as it may have been transported either from Europe or from its original home in the north-western Pacific. Opportunities for transport by both routes exist, sinee many vessels in the Japanese or European trade call at Melbourne, where Hobsons Bay forms part of the port area. It is elear, however, that *Styela clava* is able to survive and reeover from a period of immersion at tropical temperatures.

For an organism such as *Styela clava* which has a sessile adult stage, extension of its range must, if not aecomplished by man, be effected by larval dispersal. Studies by the present author (Holmes 1969) have shown that the maximal free-floating life of the eggs and larvae of *Styela clava* is of the order of 24 h at Victorian summer water temperatures. Given the fairly slow eireulation of water within Port Phillip Bay (MMBW & FWD 1973) it seems probable that the spread of *Styela clava* around Port Phillip Bay by natural means would be slow. Furthermore, natural extension of its range to other inlets of the Vietorian coast would seem to be difficult, as the highly exposed Bass Strait coast would act as a barrier to this speeies, which is apparently restrieted to sheltered locations. In the absence of knowledge of the species' lower

depth-limits it is not possible to determine whether spread through Bass Strait would be possible sublittorally.

Further spread of *Styela clava* from Hobsons Bay, or the possibility of further new introductions to Victoria or Tasmania appear to be possible only by transport on ships' hulls, be they of ships visiting from overseas or plying a coastal trade in southern Australia. The potential range for *Styela clava* in Australian waters cannot be predicted until data on temperature limits for breeding and survival are known.

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NOTE

Dr Rex Harland, Institute of Geological Scienees, Ring Road, Halton, Leeds LS15 8TQ, Yorkshire, England, furnishes the following informaton and requests that it be published in *Proceedings*: The holotypes and figured speeimens that were lodged with the Department of Geology, University of Alberta, Edmonton, Canada and whieh were deseribed by me and W. A. S. Sargeant in *Proc. R. Soc. Vict.* Vol. 83, Pt. 2, pp. 211-234, and by me in Vol. 84 Pt. 2, pp. 245-254, have now been permanently transferred to the Institute of Geological Sciences at Leeds (address above).